D6.3 DFA PROJECTS AND USE CASES

Project Number	101070421
Project Acronym	MUSAE
Project Name	A human-centered factory for a future technological sustainable development driven by arts
Project starting date	1 September 2022
Project end date	31 August 2025
Work Package producing the document	WP6
WP Lead Partner	Gluon
Other Partner(s) involved	Polimi, Abacus, UB, MADE, PAL,
Deliverable identifier	D6.3
Deliverable lead beneficiary	UB Art
Due date	30.03.2024
Date of delivery	29.03.2024
Version	1.0
Author(s)	Eloi Puig, Natalia Morales
Classification	PU - PUBLIC
Document Status	Final version

This project has received funding from the **Horizon Europe Framework Programme (HEU)** under grant agreement No 101070412.

Disclaimer: The views expressed in this document do not necessarily reflect the views of the EC.

Revision History

Version	Date	Created / modified by	Comments
0.1	15/03/2024	UB Art	First draft
0.2	19/03/2024	UCD	Revision
0.3	20/03/2024	POLIMI	Revision
1.0	27/03/2024	UB Art	Final version

Executive summary

D6.3 “DFA projects and use cases” (a) summarizes the implementation of 12 art-technology experiments carried out during the First MUSAE S+T+ARTs residency program from September 2023 to February 2024. This deliverable includes the results of two residencies - the residency with 10 artists, as well as the residency with 2 artists in Serbia, implemented by the partner (ETF Robotics). The participating artists were selected through the First Open Call. During the First Residency they developed future scenarios in the field of Food as Medicine using the Design Futures Art-driven (DFA) method, which was created by the partners in the MUSAE project. The document presents the final DFA projects of the first residency in the format of future scenarios of 12 artists. Each DFA project consists of a number of elements - cover image, scenario description, an explanatory video by the artist, a link to the DFA project on the MUSAE website, which also includes trends and elements of each scenario, and a section describing the opportunities and keywords of each scenario for other artists and/ or companies to explore further to develop innovative future-driven solutions.

The DFA projects serve as the basis for the Second Open Call, where the teams of artists and companies are expected to select one scenario and apply with a vision and defined opportunity for further incorporation of these scenarios in the food industry. Finally, the DFA projects will also constitute one of the elements of the final outcome of the MUSAE project — the Factory Model package. In this way, the DFA projects can become inspiration and examples of use cases for the audience (artists, designers, creatives, educators, companies, etc) who would like to use the DFA method or develop future-driven innovation.

Overall, the document presents a summary of the 12 scenarios developed in the First Residency as DFA projects, which emerged from a transdisciplinary collaboration between artists, project partners and other stakeholders seeking innovation through technologies and future-driven mindset.

Table of Contents

1. Introduction

1.1. Purpose of the document

Deliverable D6.3 "DFA Projects and Use Cases" provides the summary of 12 DFA projects, which were developed based on the Design Futures Art-Driven (DFA) method (D2.2, D2.3) by 12 selected artists. The development of the DFA method is the result of a collaborative effort between the Politecnico di Milano (POLIMI), Gluon and the University of Barcelona (UB) in the context of the Horizon Europe MUSAE project.

1.2. Structure of the DFA projects

DFA projects have been developed by the artists following the DFA method, which is a process based on research, creativity and envisioning. As a result, artists have produced a lot of knowledge and outputs along the process, which have to be structured in a clear format to present it to the audience. Therefore, each DFA project consists of the following items:

- **Title:** Title of the scenario created by the artist.
- **Scenario Description**: A short narrative which gives an overview of the scenario.
- **Trends**: Trends constitute the main driving forces of the scenario, explaining what current trends and developments have led to a particular scenario. It helps to understand the larger context of the scenario and its dynamics.
- **Elements**: Elements of the scenario are specific details, such as personas, objects, places, legislations, and other elements that help to immerse the audience in the future world of the scenario.
- **Ambience**: Audiovisual format, such as sounds, videos, audios help to experience the scenarios through audiovisual senses.
- **Keywords**: A set of keywords helps to identify the potential area of application of the scenario in terms of the technology application and the industry or sector for which the scenario might be relevant.
- **Opportunities**: A short description outlining the areas of opportunities for the scenario by translating the language of the artist's narrative into the concrete potential technological and industrial applications. In particular, it aims to help companies to identify what new products or services can be developed further in the scenario.
- **Video**: A recorded video of up to 10 minutes by the artist, narrating the scenario and all its elements listed above.

- **Website**: A web-page of the scenario, which contains all information and links in a digital online version.

In the final Factory Model package, which will be delivered at the end of the MUSAE project, the DFA projects will be structured this way to make them concise for understanding scenarios and opportunities related to them, but also allow the audience to immerse in the future world of the scenarios by exploring their elements. In the next section, DFA projects are presented with the following elements: Scenario description, Cover image, Keywords, Opportunities, Video and Website page. Trends, Elements and Ambience of each scenario can be explored further on the webpage of each scenario.

2. DFA projects: First Art-Tech Residency

2.1. The Microbial Renaissance: A Culinary Tech Revolution

Arist: Chloé Rutzerveld

2.1.1. Scenario description

The Microbial Renaissance marks a transformative era in culinary practices and sustainable food innovation, with the culinary arts seamlessly transitioning to cutting-edge technology. The use of animal-based ingredients and the depletion of our natural resources have become outdated practices. What if we replace animal-based products with biologically identical ingredients synthesized directly by microorganisms, paving the way for a more sustainable world? Microbes, including bacteria, yeasts, fungi and micro-algae, can be used as 'cell factories'. Scientists can 'program' these organisms to produce a specific protein, carbohydrate, fat, vitamin or aroma in a growth tank. This is called precision fermentation. After harvesting the ingredients, they can take on any shape, flavor and texture we want using digital production techniques. However, imagining interesting novel food products that do not resemble existing products but still look edible, is very difficult. By making smart use of artificial intelligence tools, we can go beyond the limitations of our own imagination and revolutionize the products we consume. But just adjusting our diet is not enough for this culinary transformation. Deliverables should be circulated already formatted with this template and with a reasonable formal quality (in particular remember that we chose to adopt Br En spelling).

A cultural revolution is needed - one that involves the entire community and generates enthusiasm for an alternative approach to food production, cooking, eating and social interactions around food.

In the age of the Microbial Renaissance, each moment becomes an exploration, every dish a creation, and every encounter a celebration of the boundless possibilities unlocked by the wondrous world of microbial-based foods.

2.1.2. Keywords

Precision Fermentation # Trust # Consumer Acceptance # Radical New Foods # Microbial-based Food # Food Design

2.1.3. Opportunities

There are opportunities for companies specializing in food technology, biotechnology and AI. They can spearhead the development of precision fermentation techniques, ushering in a new era where microorganisms serve as 'cell factories' to synthesize biologically identical ingredients, thus replacing traditional animal-based products and advancing food sustainability. Additionally, by harnessing digital production techniques, these companies can mold, flavor, and texture the harvested microbial-based ingredients, unleashing a realm of novel food products with diverse sensory experiences. Moreover, the integration of artificial intelligence tools empowers them to transcend the confines of human creativity, revolutionizing the design and development of microbial-based foods. However, beyond technological advancements, a cultural revolution is imperative, necessitating community engagement and enthusiasm for alternative approaches to food production, cooking, and social interactions. There are opportunities for companies working with novel foods to create strategies for increased consumer acceptance.

2.1.4. Video

https://youtu.be/lmT-thzO4QY

2.1.5. Website page

https://musae.starts.eu/musae/2nd-open-call-scenario-by-chloe-rutzerveld/

2.2. Soil Skinships: soil fertility and our reproductive futures

Artist: Lisa Mandemaker

2.2.1. Scenario description

In the year 2034, a transformative shift in human consciousness has reshaped the way we interact with our planet and envision our future. The narrative of human existence, deeply intertwined with the soil, has taken center stage.

In this new reality, 'skinship' symbolizes the intimate bond between human skin and the Earth's skin, the soil. It marks a departure from the Anthropocene era towards a more harmonious coexistence. This shift was catalyzed by crises that forced us to reevaluate our priorities,

moving away from short-term thinking and nationalism. Instead, inclusivity, diverse perspectives, and technology as a connector with nature guided our path.

Advanced technological augmentation devices, seamlessly integrated with human skin, allow people to connect intimately with the land. These devices collect real-time data about soil health and fertility, translating it into physical sensations that wearers can feel. Communities adopt rituals that harmonize with the rhythms of the land, empowering individuals to understand their own personal fertility in sync with the Earth. The rise of In Vitro Gametogenesis (IVG) technology, allowing the creation of human reproductive cells from human skin cells, further deepens this bond. Some pioneers even started to explore the idea of 'genetic babies' with the Earth, envisioning offspring inextricably linked to the soil.

This transformative narrative extends beyond human reproduction; it revolutionizes food production, shifting from conventional to regenerative practices. Augmentation devices contribute to a global network of soil health monitoring, creating a harmonious cycle where the Earth's skin's well-being sustains humanity.

In this possible future, survival is a collaborative effort, a testament to the resilience of communities navigating the delicate balance between human and soil fertility. 'Skinship' emerges as a symbol of unity, emphasizing the physical bonds between human life and the living, breathing skin of the Earth.

2.2.2. Keywords

Wearable Devices # Regenerative Agriculture # Precision Farming # Soil Monitoring Sensors # Soil Health # Real-time Data Collection # Human-Soil Bond

2.2.3. Opportunities

There are opportunities for companies working with wearable technology that can develop devices capable of integrating with human skin to sense and communicate soil health and fertility, companies specializing in augmented reality that can create experiences allowing individuals to visualize and feel their connection with the land and its rhythms; companies developing precision agriculture tools that align closely with the natural cycles of the land, minimizing environmental impact and enhancing biodiversity; lifestyle brands that align with the principles of inclusivity, diversity, and harmonious coexistence with nature, potentially offering products or experiences that enhance the human-soil bond.

2.2.4. Video

https://youtu.be/XAVR-E8g5q0

2.2.5. Website page

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-lisa-mandemaker/

2.3. Food Beyond Food: what is food without its origin?

Artist: Eleonora Ortolani

2.3.1. Scenario description

The assessment of food and its quality has traditionally hinged on its geographical origin. Within the food industry, scrutiny and investigations into a product's origin have played a crucial role in determining its quality. Prestigious products from various corners of the globe have been manufactured and exported as premium offerings, undergoing rigorous testing and certification as "protected and certified origin," thereby elevating them to a status of luxury on our dining tables.

It is now the year 2044. The increasing global population and the environmental impact of climate change on conventional food production have compelled us to explore alternative resources for the food industry. Many staples that have long defined our cultural cuisine are now produced through lab-grown, hydroponic, and genetically modified methods. However, this approach standardises food quality and characteristics globally, transcending geographical origins and traditions.

In a world where the best can be found anywhere, the concept of "authentic" is redefined. As food remains an anchor to traditions and community belonging, what is a national cuisine without the geographical ties we once knew? This transformation prompts contemplation on

the essence of food, its identity and cultural significance in a world where origin becomes a malleable concept.

2.3.2. Keywords

AI-driven Quality Control Systems # Certification Tools # Biosensors # Traceability and Transparency Systems # Authentication # Food Safety

2.3.3. Opportunities

There are opportunities for companies to explore alternative food production methods in response to the challenges posed by the increasing global population and climate change. With the traditional emphasis on geographical origin diminishing, a chance arises for businesses to pioneer alternative food production methods. Innovations in food identity and quality standards become paramount, offering opportunities for businesses to establish new benchmarks and certifications in this evolving culinary frontier. Additionally, companies can develop technologies for standardizing food quality globally and ensuring transparency in the supply chain through traceability solutions.

2.3.4. Video

https://youtu.be/VKvydSZhddA

2.3.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-eleonora-ortolani/

2.4. Bio-Intelligent Data

Artist: Sanja Sikoparija

2.4.1. Scenario description

The future is embodied by divergent food systems and complex food value chains, each giving rise to a vast repository of data. The food system, struggling to respond to changing climate, resource distribution, and increased population-related demands, has evolved along a set of opposed pathways. Consequently, these pathways represent distinct value systems and exert long-term impacts on the landscape and environment. Vertically integrated industrial agriculture, including organic practices, has taken over even more of the food system market. The lab-grown food sector, particularly lab-grown meat, has developed substantially. Meanwhile, smallholder farming persists, albeit to varying extents.

In this unfolding landscape, data economies are not merely an emerging force but stand as the dominant economic sector, fundamentally reshaping the foundations of commerce. At the heart of this transformation lies big data, a ubiquitous force seamlessly integrated into the food value chain. The symbiotic relationship between big data and the food value chain has become so pronounced that they are virtually synonymous. Across the globe, electronically stored chronological lifespans document every nuance of food production.

Leveraging the biological intelligence of the human body as a source for decision-making, new horizons for understanding and harnessing the intelligence of the natural world exist, paving the way for a deeper understanding of the biological world. An organic and emotion-based network connects people to their environment, rooted in living data. The visual representation of this data and the built and natural environment have fundamentally changed and represent a more flexible and responsive tapestry, leaving the transitions between data and reality blurred.

2.4.2. Keywords

Agri-Tech # Precision Agriculture # Biosensing # Tailored food systems # Food Supply Chain traceability # Food Retail # Environmental Monitoring

2.4.3. Opportunities

There are opportunities for companies specializing in precision agriculture, using data analytics, AI, and IoT to optimize crop yields, manage resources efficiently, and minimize environmental impacts; companies developing predictive analytics tools and decision-support systems to help farmers, distributors, and retailers make informed, data-driven choices; enterprises utilizing blockchain technology to create transparent, tamper-proof records of food origins, handling, and quality, enhancing trust and accountability in the food value chain.

2.4.4. Video

https://youtu.be/mf0BQFc5PoU

2.4.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-sanja-sikoparija/

2.5. One Health Alliances

Artist: Nonhuman Nonsense

2.5.1. Scenario description

In 2033, a profound shift in governance models is underway, challenging traditional notions of authority. Fueled by a lack of trust in human leadership's ability to address the environmental crisis, breakthroughs in AI development have given rise to unprecedented collaborations between humans and nonhumans. The EcoMind Alliance, led by the Artificial Intelligence – GAIA, emerges as a pioneering political party, uniting scientists, farmers, indigenous communities, activists, and technologists.

In this envisioned future, the planet undergoes unprecedented monitoring through an intricate network of satellites and sensors, gathering data from diverse ecosystems—forests, oceans, insects, and plants. GAIA-AI interprets this wealth of information in collaboration with local communities, fostering a

synergistic relationship between artificial intelligence and human insights. This dynamic interaction gives rise to new policies, the implementation of regenerative farming practices, and the establishment of Earth Rights — recognizing the Earth as a community of interconnected subjects.

The EcoMind Alliance operates under the guiding principle of 'One Health,' embracing a holistic perspective that acknowledges the intricate interdependence of all earthly beings. The alliance's endeavors, such as the "seed currency," mark a crucial step toward harmonizing the human economy with the delicate balance of the Earth's ecology. Through collaborative efforts, they navigate the complexities of environmental challenges and seem to be a step towards a future where humans and nonhumans coexist in a mutually beneficial and sustainable equilibrium.

However, amidst the promise of the EcoMind Alliance, the RealNature group emerges as a formidable opposition. Comprising tech skeptics echoing the historical Luddite movement, they adamantly resist the integration of advanced technologies. Fearing the perceived threats of AI, this group actively sabotages the AI-driven pilot farms established by the EcoMind Alliance. Messages exchanged within this group reveal a deep-seated fear of losing the authenticity of nature to the encroachment of artificial entities.

In light of these tensions between technological progress and natural preservation, a crucial question arises: To what extent should AI be entrusted with decision-making in areas crucial to environmental sustainability, and what safeguards should be in place?

2.5.2. Keywords

AI-Powered Policy Development # Environmental Conservation # Climate Mitigation # Biodiversity Protection # Technological Resistance # Ethical AI Frameworks # Transparency and Accountability

2.5.3. Opportunities

There are opportunities for companies to create AI-driven policy development tools that analyze environmental data and stakeholder input to inform evidence-based policymaking. These tools can help governments and organizations design and implement effective policies for environmental conservation, climate mitigation, and biodiversity protection. Companies can develop ethical frameworks and safeguards for AI technologies used in environmental decision-making. This may involve designing AI systems with transparency, accountability, and human oversight to address concerns about technological encroachment on nature and human autonomy.

2.5.4. Video

https://youtu.be/PbxqdSSc2eI

2.4.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-nonhuman-nonsense/

2.6. Holobiont Gardens

Artist: Baum & Leahy

2.6.1. Scenario description

Holobiont Gardens explores a future where healthcare is shaped by environmental microbial justice, and emerging technologies converge with Traditional Ecological Knowledge (TEK). Public access to beneficial microorganisms is recognized as a human health right, and as such, accessible microbiome testing is widely available, along with community-embedded science, to develop care plans alongside prescriptions for pre-and probiotics, soil contact time plans, and medicinal foods. Pharmacies open connected Holobiont Gardens, which facilitate access to these prescriptions, as well as being a space for mapping information on Holobiont connections. Public awareness of microbial equity is more prevalent following protests against the 'Silent Microbiome Crisis' – the unseen depletion of global microbial diversity and the effect this has on individual, collective, and planetary health. In addition, scandals surrounding extractive methods of biobanks, as well as their targetability for biohacking, have resulted in more legislation around the protection of microbial species. Government-funding training in microbiome stewardship has created new occupations and jobs in ecological restoration, regeneration, and care work. Traditional ecological knowledge guides urban dietary choices, incorporating a rich tapestry of locally sourced, plant-based, and fermented foods that support a resilient and balanced gut ecosystem. Additionally, increasing urban biodiversity influences the diversity of available food sources, creating a more complex and dynamic landscape for the gut microbiome. Community-driven initiatives promote sustainable agriculture, local food production, and waste reduction, further enhancing the diversity of nutrients available. Nourishing growth, transformation, mapping, mystery, and healing, the Holobiont Gardens are a space for people and microorganisms to come together with the aim of nurturing multispecies and collective health.

2.6.2. Keywords

Microbiome Testing Platforms # Community-Driven Research Networks # Digital Garden Management Systems # Microbial Protection Technologies # Ecological Restoration Solutions

2.6.3. Opportunities

There are opportunities for companies to pioneer in environmental microbial justice and holistic health. It opens avenues to develop user-friendly microbiome testing platforms, collaborative research networks, and digital management systems. Additionally, there is a need for innovative technologies to protect microbial species and support ecological restoration efforts, fostering a more sustainable and interconnected relationship between human and microbial communities.

2.6.4. Video

https://youtu.be/GRTdkg1Sg0I

2.6.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenario-by-baum-leahy/

2.7. What the World Eats. Agro-technologies in Earthly Futures

Artist: Peter Andersen

2.7.1. Scenario description

The scenario includes past and contemporary patterns to envision a future transformative paradigm in the convergence of technology, agriculture, and the environment. Should we broaden our consideration of who benefits from our food choices, placing emphasis on the concept of gratitude for the gifts the world provides us and recognizing our obligation to ensure the care of more-than-human lives and the overall well-being of our planet? In recent decades, the world has been quite literally eating the waste chambers of packaging, plastics, electronic waste, etc. At the same time, our reliance on agricultural and ecosystem knowledge, to a larger extent, will rely on digital and technological apparatuses.

Nothing nutritious will grow in the digital rubbish, nor will anything pollinate in a digital twin; few earthbound intimacies can rummage in the excess work of software and hardware maintenance. Do these elements take the appearance of the Talmudic myth: the Golem, an automated being gone on a killing frenzy until returning to dust? We need machines, just as rock-based machines one day will turn to dust and become soil again. The Rooiboit Nutritura Antessorem takes this life span of technological apparatuses seriously and explores the ancestral dimension of imagining agro-technological machines. It includes past and contemporary patterns to envision a future transformative paradigm in the convergence of technology, agriculture, and the environment. Not only should it nurture and express gratitude to its predecessor—the Earth, its minerals, and soils—but also to the future generations of life and the potential for differentiation. If opening up for symbiosis across intergenerational time-space, then what is the agri-technological machinery of the future? Can technology itself become compostable for the earth? Should the conception of tech be expanded to include traditional ecological knowledge? Can we incorporate non-human sensibility and bio-machines in food systems, as well as affirmative towards difference?

2.7.2. Keywords

Sustainability # Environment-friendly technology # Agriculture of precision # Eco-friendly

packaging # Renewable technology

2.7.3. Opportunities

There are opportunities for agrotech companies specializing in the development of agricultural technologies that are compostable or biodegradable, minimizing waste and environmental impact; technological firms that focus on the creation of hardware that is designed to have a minimal environmental footprint and can be integrated back into the earth without harm; waste management enterprises focusing on the transformation of electronic and plastic waste into useful materials for agricultural or technological purposes; companies specialized in green technologies aiming at powering agricultural technologies without contributing to pollution or waste; tech firms creating smart packaging solutions that integrate with digital systems to monitor freshness, reduce waste, and improve the supply chain's efficiency and transparency.

2.7.4. Video

https://youtu.be/BhDZWj1rD08

2.7.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-peter-andersen/

2.8. PATTERNS THAT PERSIST: Biodiversity As The Measure Of Healthy Human Food Systems

Artist: The Center for Genomic Gastronomy

2.8.1. Scenario description

What if… Biodiversity became the main measure of healthy human food systems?

This scenario imagines that in 2033, the buzzword in every part of the food system will be biodiversity. Attempts earlier in the 21st century for food systems to be chemical-free or carbon-neutral had limited uptake and impact. The scenario suggests that in 2028, the European Commission approved quite radical legislation called Maximizing Biodiversity. Since then, the increase in agricultural and wild biodiversity has had a big impact on the food system, with tangible and measurable changes and impacts, both good and bad. The story follows a journalist named Max, who travels through Europe in 2033, where he meets various stakeholders affected by this European focus on maximizing biodiversity.

From radical fringe groups in remote areas to the largest ag-tech corporations, everyone is looking for ways to make kitchens, farms, and rural landscapes more biodiverse. Max is particularly interested in talking to the farmers and citizens who feel left behind by the new focus and the network of regenerative farmers and food producers who work to heal agricultural landscapes.

For example, in Poland, he speaks with a traditional farmer who struggles to adapt. As the farm adapts to new requirements, the less the farmer is sure what he is even farming. However, in Portugal, he meets a technician who designs monitoring tech for food forests, a pioneer in optimizing community-based emerging technologies for biodiversity and environmental healing. She has developed open-source DIY technologies that monitor the health and biodiversity of food forests, such as an AI-enabled audio ecology device and software and an online platform that connects producers with eaters. He also attended the filming of a talk show in Serbia about the future of food, where he observed that food is a playground for new possibilities and hybridities but also a battleground of polarised identity politics. Who do you think Max should visit?

2.8.2. Keywords

Food System Regulation # AgriTech and Farming # Precision Agriculture # Biodiversity.

2.8.3. Opportunities

There are opportunities for companies specializing in precision agriculture technologies that can monitor and manage the biodiversity of farms, food processors looking to adapt their supply chains to source more biodiverse ingredients and promote sustainable practices, companies creating platforms that connect various stakeholders in the food system, fostering a community around biodiverse and sustainable food production; organizations providing training and resources to farmers and communities to adapt to the new biodiversity-focused regulations and practices..

2.8.4. Video

https://youtu.be/ppoA4wh-SiM

2.8.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-catherine-kramer/

2.9. From Farm to Table in a Hyperconnected World: A Journey Through Macro to Micro Experiences

Artist: Frederik de Wilde

2.9.1. Scenario description

From Farm to Table in a Hyperconnected World explores a dynamic journey through three interconnected scenarios that traverse the realms of macro-to-micro experiences within the contemporary food landscape. Rooted in a complete food chain, the narrative unfolds against the backdrop of AI technologies, robotics, and immersive technologies. These innovations enable real-time monitoring and adaptive processes throughout the entire agricultural and culinary continuum.

The overarching scenario envisions an innovative hybrid encompassing traditional agriculture, agroforestry, and lab-grown food products. This symbiosis is powered by a diverse array of cutting-edge technologies, including AI, IoT, robotics, and remote sensing. The integration of these technologies is humanized through communal experiences enriched by immersive art and gamification, ensuring data transparency and compliance with AI ethical standards.

As the scenarios transition from macro to mezzo and micro levels, novel features emerge, such as edible electronics and soft robotics. A distinctive highlight is the introduction of personalized augmented sensory dining experiences, intricately woven with personal data. This approach not only allows for the incorporation of the individual into the culinary process but also addresses the complexities of data ownership in a hyperconnected, post-globalized world characterized by both centralized and decentralized influences, impacting every facet of our in-real-life (IRL) and online (URL) existence.

In this narrative, the coexistence of natural and digital ecologies is paramount, presenting a holistic vision where technology and nature seamlessly intertwine to shape the future of our food experiences.

2.9.2. Keywords

Health and Wellbeing # Agricultural Technology # Edible Technology # Gamification # Education.

2.9.3. Opportunities

There are opportunities for companies working in different areas, ranging from technology providers to food industries, education to nutrition, agriculture to artificial food. For example, robotics may further support agriculture through a novel immersive approach and remote sensing, and AI may feed new ways to support nutrition choices and education. The approach needs to be holistic to push a smooth integration of the natural and digital worlds.

2.9.4. Video

https://youtu.be/01sCE1L7aFQ

2.9.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-frederik-de-wilde/

2.10. The Cooking Ape Institute

Artist: Maciej Chmara

2.10.1. Scenario description

The preparation of food can have an important role in our society in the context of the umbrella term "Food as medicine". It can have mental, physical, and ecological benefits. How is it possible to support and revolutionize the process of cooking, baking, and food preparation?

Cooking can take on a whole new role in our society through a holistic approach, with the cornerstones being personalized and environmentally friendly nutrition (such as the Planetary Health Diet) as well as mental health through multi-sensory perception during the preparation process. This concept, leading to improved mental and physical health, is by no means the romanticization of grandma's cooking. In an increasingly digitalized society, the physical and psychological needs of sensory activities are often neglected. Our senses provide us with orientation and mental balance. It is always an interplay of several senses that allows us to perceive the world. In psychology, this is known as multi-sensory experience and is particularly prominent in the culinary world, where haptics, acoustics, olfactory, gustatory, and visual senses create a shared experience. Looking at the preparation of food in evolutionary terms, we could argue that our fine motor skills, the development of various technologies, and the handling of new materials are strongly linked to the preparation of food. In addition to the multi-sensory aspects of preparing food, especially when working with sourdough or other fermented products, there is a microbial exchange that can benefit both the product and the person cooking it. The current discourse on inter-species relationships in the context of the ecological crisis shows that there can be no debate on human well-being without including other life forms. Could we reinvent the wayhow we prepare food and create a multi-sensorial and inter-species experience for a physically, mentally, and ecologically healthier life?

2.10.2. Keywords

Personalized Nutrition Solutions # AI-Driven Recipe Development # Holistic Food Preparation # Culinary Education # Kitchen Appliances # Microbiome Health-Tech.

2.10.3. Opportunities

There are opportunities for companies in health and wellness, culinary education, and the food industry, encompassing personalized nutrition solutions, AI-driven recipe development, and innovations in technology-enhanced kitchen appliances. The food industry, keen on staying at the forefront of consumer trends, can explore AI-driven recipe development and robotics in commercial kitchens to meet the growing demand for health-conscious and innovative culinary offerings. Additionally, companies focused on microbiome and health tech can collaborate to develop products and services that align with the scenario's emphasis on health-optimized meals and stress reduction during food preparation. This scenario offers a landscape where companies can pioneer advancements, foster innovation, and align their

offerings with the evolving dynamics of holistic, technology-enhanced food preparation.

2.10.4. Video

https://youtu.be/wCvn5bQS0xU

2.10.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenariosl-by-maciej-chmara/

2.11. Healthy Food Protocols

Artist: Katarina Andjelkovic

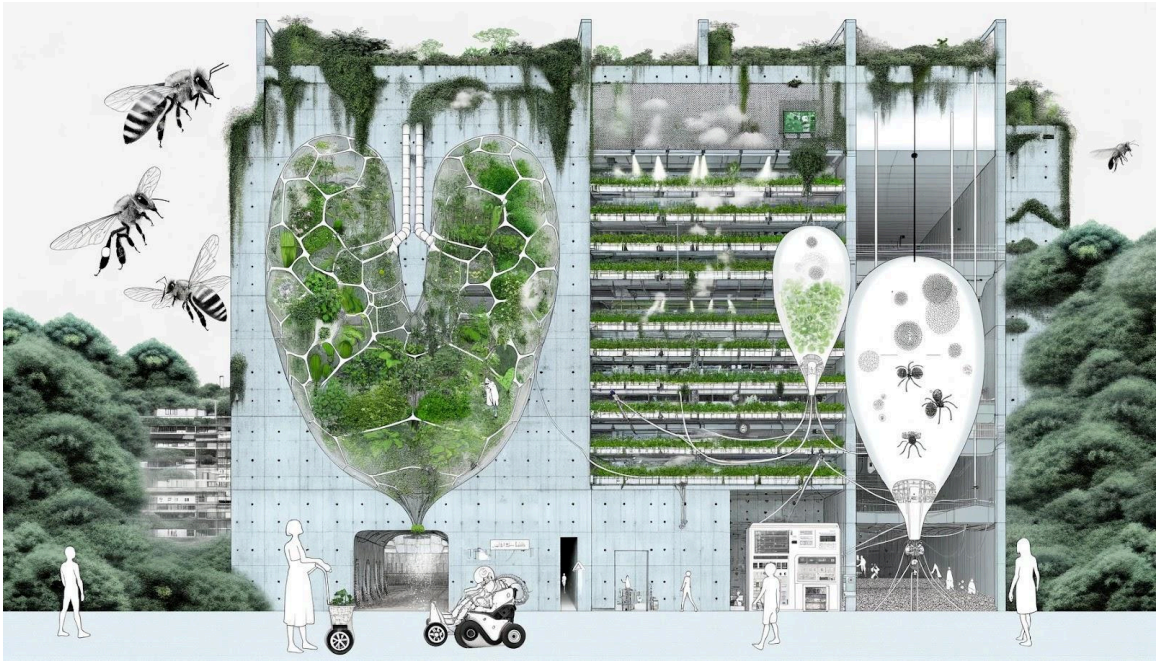
2.11.1. Scenario description

The deep political, economic and social crisis has seen Serbia of 2034 as a country of the poor, leaving almost every seventh resident below the minimum survival income. The "Right to Food" protocol has been adopted to enable a sustainable, social and united economy of healthy food chains in big cities by operating within community urban farms.

It deals with concepts, methodologies and technologies to construct an innovative concept of community that aims to empower vulnerable populations by testing different configurations of life, work and farming. What if food can act as a catalyst for societal change and community building?

The scenario introduces several community tech gadgets (brace, brick, balloon, robot bee) from the belief that they contribute to retrieving faith in the concept of community built on ecological, cultural and humanist values of communal living in this hyper-individualized tech world. The scenario envisions the capacities of the collective intelligence of all involved citizens to bring closer the future well-being of the most vulnerable members of our society while allowing them to actively participate in future changes in their local communities and food practices.

Moreover, moving from standard practices of farming to algorithmically generated farms with underlined machine learning and robotic systems, AI technologies enhance the decision-making processes to maintain food security, increase the nutritional value of food, secure the most personalized food consumption model and therefore improve our health and the overall human condition. It is a technology that not only administrates farm infrastructure and enhances the types of necessary data models in support of farm management, and types of crop production and responds to a poly-organized farm production area, but also contributes to our understanding of the reality of current food production in the city and size-optimization of the city farming.



2.11.2. Keywords

Urban Farming # Sustainable agriculture # Smart City solutions # Community development # Environmental sustainability # Inclusivity

2.11.3. Opportunities

There are opportunities for companies that are involved in urban farming and agriculture technology, sustainable food production and distribution, smart city infrastructure and technology, community development, environmental and ecological sustainability, health and wellness, education, and urban planning and design. Specifically, companies specializing in urban farming solutions, vertical farming systems, hydroponics, and aquaponics could be intrigued by this scenario, while businesses focusing on sustainable agriculture, organic farming, and food distribution systems might get potential ideas for addressing food insecurity. Next, companies offering smart city solutions, including those involved in IoT (Internet of Things), AI, and data analytics for urban planning and management, could find this scenario relevant. Moreover, organizations that specialize in community development, social impact initiatives, education and training in agriculture, and fostering collaboration between residents and local resources may resonate with the vision of community urban farms. Then, companies focusing on health and wellness products and services could see value in this scenario. Finally, companies specializing in urban planning, architecture, and landscape design might be interested in contributing to the design and development of agro-urban communities that prioritize food security, social cohesion, and environmental sustainability.

2.11.4. Video

https://youtu.be/059xyhUrRkE

2.11.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios

2.12. Poetry of Nutrition

Artist: Irena Djukanovic

2.12.1. Scenario description

What are our true priorities? Is nutrition the most extensive field of destructive consumerism or a noble means of survival? Poetry of Nutrition is a realistic dystopian industrial saga with an optimistic and brave revolutionary twist. Let's imagine the future we really want to have in spite of everything.

The global health crisis in the near future will reach its peak by 2030. The mental and physical health of all generations rapidly deteriorated. Huge protest outbreaks and changes of governments follow all around the globe due to this immense threat that 35% of the previously employable population is unable to work and economically contribute.

A new additional health system is established. The Nutritional Health System is merging sophisticated technology with the valuable therapeutic tradition of psychotherapy. Soft robots are used to bring people closer especially among different generations while learning how to control the food production and market. With beautiful somatosensory and visually opulent behavior the robots appeal to humans much more than the dry warnings of doctors from the past. This empathetic appearance of robots opens people's true motivation to change and implement new habits. Art, humanities, medicine, and science completely fuse and intertwine.

Industry follows the lead and offers plenty of products that can help the general cause of the battle for collective health. Food therapy apps, pesticide monitoring drones, statistical dishes, and educational therapeutic computer games mold the new everyday experience.

Outside of the health system, the creation of communities branches out and people start to connect and nurture relations with local farmers and food producers. They switch from global brands to local small sources of food. They turn to the food that they can trust and feel as theirs truly. A communal chain of practical empathy is established. People rediscover the true meaning of community and collective health.

2.12.2. Keywords

Holistic food perspective # Healthcare and wellness # Soft robotics # Empathy #Sustainable agriculture

2.12.3. Opportunities

There are opportunities for companies that are involved in food technology and innovation, healthcare and wellness, robotics and AI, agriculture and sustainable food production, education, community building, data analytics, and gaming. Precisely, companies that develop food apps, innovative food products, technologies for monitoring food quality and safety could see potential in this scenario. This includes companies working on food processing, packaging, and distribution technologies. Next, healthcare companies focusing on mental and physical health solutions, as well as those involved in psychotherapy and holistic wellness approaches. Companies specializing in soft robotics and artificial intelligence, particularly those interested in applications for human-robot interaction could be intrigued by the use of empathetic robots in the scenario. On the other side, businesses engaged in sustainable agriculture, organic farming, and local food production may see potential in the shift towards supporting local farmers and food producers. This includes companies offering agricultural technology solutions and services. Companies specializing in data analytics and artificial intelligence, especially in the context of personalized nutrition and behavior change, could be interested in leveraging data to promote healthy habits and optimize food production and distribution systems.

2.12.4. Video

https://youtu.be/6bXTzkeKreQ

2.12.5. Website

https://musae.starts.eu/musae/2nd-open-call-scenarios-by-irena-djukanovic/

3. Conclusion

Twelve artists participated in the First Residency program, where they utilized the DFA method and received training and mentoring from the consortium partners and external experts to develop future scenarios related to the Food as Medicine sector. The scenarios, meeting the expectations of the MUSAE consortium, address various challenges and opportunities for technological innovation in the field. These scenarios will serve as a basis for the next Open Call and Residency Program to explore opportunities and create future-driven prototypes of TRL5 based on these scenarios.